



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/829,392	04/22/2004	Hermann Wagner	KEKO-0002	5417

23599 7590 11/06/2006

MILLEN, WHITE, ZELANO & BRANIGAN, P.C.
2200 CLARENDON BLVD.
SUITE 1400
ARLINGTON, VA 22201

EXAMINER

GEORGE, PATRICIA ANN

ART UNIT	PAPER NUMBER
----------	--------------

1765

DATE MAILED: 11/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/829,392

Applicant(s)

WAGNER ET AL.

Examiner

Patricia A. George

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 September 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-43 is/are pending in the application.
- 4a) Of the above claim(s) 11-23,25,27,32,33,36 and 37 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10,24,26,28-31,34,35 and 38-43 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

Claim 38 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Regarding claim 38, the phrase "having a thickened edge region" renders the claim indefinite because every layer has a thickness, or a thickened edge, it is unclear what having a thickened edge region is referring to.

Claims 1 and 10 recite the limitation "said layer defining an edge region" in Line 3. There is insufficient antecedent basis for this limitation in the claim. Applicants' specification discusses that the edge region to be removed is defined more precisely by means of the focusing the lens at the edge, but examiner finds no reference to a layer defining an edge in applicants' specification.

Double Patenting

Applicant is advised that should claim 1 be found allowable, claims 10 and 38 will be objected to under 37 CFR 1.75 as being a substantial duplicate thereof. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 5, 10, 30, and 38 rejected under 35 U.S.C. 102(e) as being anticipated by Reder et al. (6,874,510) (herein referred to as Reder), evidenced by Jurik et al. (Laser – Assisted Particle Removal; 11/24/2003)

As for claims 1, 10, and 38, Reder teaches a method of processing a substrate for use in a micro-lithographic process, said substrate having a surface and a layer applied thereon, said layer defining an edge region at the perimeter of said substrate, said method comprising: imaging a laser beam onto the edge region of said layer by means of laser beam (see DD, col.2 through col. 3).

It is noted that the reference of Rizvi et al. is silent about the occurrence of “evaporation”. However, evaporation would inherently occur because the same step that is responsible for evaporation (i.e. ablation with laser beam) is occurring. The reference of Knowles et al. (Micromachining of Metals, Ceramics, Silicon and Polymers using Nanosecond Lasers) evidences the fact that laser ablation is known to cause evaporation. See the abstract of Knowles et al., where it is taught, it is usual for ablation to be a combination of evaporation.

As for claim 2, Reder teaches the laser beam is focused to form a point of contact (i.e. in the form of a point) onto the edge region by means video monitoring (i.e. an imaging means) (see col. 4, lines 45-47).

As for claim 5, Reder teaches removing evaporated fragments and particles of the edge region by blowing a purge gas through the nozzle of the laser (i.e. a blower device which is arranged in the proximity of the edge region). See col. 3, lines 10-20.

With respect to claim 30, Reder teaches rotating the chuck, while directing a laser at the edge of the wafer, to remove unwanted deposits at the edge of the wafer, which is written on edge region, along the entire perimeter of said substrate, is completely removed.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 3-4, 6, 7-9, 24, 26, 28-29, 31, 39, 40, 42, and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reder, as applied to claims 1, 2, 10, 30, and 38 above, in view of Rizvi et al. (Direct manufacture of Miniature Bio-Particle Electro-

manipulator Devices using Excimer Laser Mask Projection Techniques; 1998; Exitech Limited, Long Hanborough, Oxford OX8 8Lh, UK) evidenced by Scott (Overview of Spin Coating; 12/01/2000; www.polymerprocessing.com) and Knowles et al. (Micromachining of Metals, Ceramics, Silicon and Polymers using Nanosecond Lasers) and Lumonics (Lumonics INDEX: Excimer Lasers for Industry).

Reder fails to teach the beam is imaged in a manner that is incident on the surface in an essentially perpendicular direction as in claim 3.

As for claim 3, Rizvi et al. teaches the beam is imaged in a manner that is incident on the surface in an essentially perpendicular direction (see fig. 1a).

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to include the beam is imaged in a manner that is incident on the surface in an essentially perpendicular direction, as Rizvi, when using the method of imaging a laser beam onto an edge region, as Reder, because Rizvi teaches laser projection techniques developed specifically for miniature devices (see abstract), resulting in high resolution and a process that is compatible with a variety of different materials, making the process attractive for the development of novel devices (i.e. a process advancement).

As for claim 4, Rizvi et al. teaches the laser beam is incident on the plane spanned by the substrate that is in a tangential direction, which is substantially parallel (see fig. 2).

Semiconductor substrates are well known to come in a variety of shapes including circular and rectangular. See the Semiconductor Glossary's page three for evidence that wafers are typically made from circular rods (i.e. are circular in shape, as in claims 6, 30, 31, and 42) and Riesselmann's page three for evidence of rectangular shaped wafers, as in claims 34, 35, and 43.

As for claims 6 and 40, Rizvi et al. teaches the layer comprises a coating of polyimide (see page 4, second column, paragraph stating with "Having..."), a known photoresist, on multilevel thin film devices (see abstract).

As for claim 7, Rizvi et al. teaches the substrate and laser are moved relative to each other, while the laser scans the region (see fig. 2).

As for claim 8, Rizvi et al. teaches the edge region removed by the laser beam is optically scanned to adapt and regulate the removal of the resist to insure the desired edge region is completely removed (see fig. 2).

As for claim 24, Rizvi et al. teaches the laser beam is focused in the form of a line (see fig. 1a).

As for claims 26 and 28, Rizvi et al. teaches the beam is focused by means of a projection lens (see page 2 line 7), which is cylindrical (see fig. 2).

As for claim 29, Rizvi et al. teaches use of a micromachining system, which operates a 248nm KrF excimer laser (see page two, column 2, paragraph 2). 248nm KrF excimer lasers are rate by manufacturer having the average power normally in the range of 10 watts to 100 watts, which encompasses and overlaps applicants' claimed

range. (see page 1, section "What is an Excimer Laser?", of Lumonics INDEX Excimer Lasers for industry, for evidence of said power rating.)

It is noted that the reference of Rizvi et al. is silent about the occurrence of "evaporation". However, evaporation would inherently occur because the same step that is responsible for evaporation (i.e. ablation with laser beam) is occurring. The reference of Knowles et al. (Micromachining of Metals, Ceramics, Silicon and Polymers using Nanosecond Lasers) evidences that laser ablation is known to cause evaporation. See the abstract of Knowles et al., where it is taught, it is usual for ablation to be a combination of evaporation.

With respect to claim 31, Reder teaches rotating the chuck, while directing a laser at the edge of the wafer, to remove unwanted deposits at the edge of the wafer, which is written on edge region, along the entire perimeter of said substrate, is completely removed.

With respect to claim 39, Scott evidences it is well known in the art that photoresist is typically applied to said substrate by spin coating, as in claim 39 (see page 1 of 1).

Claim Rejections - 35 USC § 103

Claim 9 rejected under 35 U.S.C. 103(a) as being unpatentable over Reder as applied to claims 1, 2, 5, 10, 30 and 38 above, and further in view of Waddell et al. (UV Laser Micromachining of Polymers for Microfluidic Applications; JALA; Vol.7, No. 1,

Feb/mar 2002) and Bostanjoglo et al. (Design of variable reflective mirrors and unstable resonators for ND: YAG lasers with high average power; 1994; IOP Publishing).

As to claim 9, the reference of Reder is silent about the use of an aperture, as the limitations of claim 9.

Waddell et al. teaches it is known that an aperture defines what image is to be focused on a substrate, therefore preventing the laser from being imaged onto regions other than the desired area, by focusing the light through the aperture of a certain size and shape. (see col. 1, page 80) Therefore only the undesired part of the beam is blocked (i.e. not transparent to the laser beam).

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to use an aperture that blocks the undesired portion of the laser beam (i.e. using an aperture which is not transparent to the laser beam), as Waddell et al., when performing the laser removal method, of Reder, because Waddell et al. teaches by controlling ablation parameters one can tailor the device characteristics to the particular needs of manufacturing, a known process improvement (see page 82, col. 1).

As for the aperture being arranged at a predetermined distance from the surface, Bostanjoglo et al. teaches a known and effective method for determining the distance of the aperture from the substrate, which illustrates the aperture can be arranged at a predetermined distance from the surface of the substrate (see page 506, first para. abridged from page 505).

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to prearrange the distance of the aperture from the surface of the substrate, as Bostanjoglo et al., when imploring the method of laser removal, as Reder, because such calculations need to be taken into account to determine thickness distribution and the damage threshold of the film, known control for a quality laser process (see page 506, para. 1).

Claim Rejections - 35 USC § 103

Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Reder, as applied to claims 1, 2, 5, 10, and 38 above, further in view of Chang et al. (Micro-optic fabrication using laser ablation process; Proc. SPIE Vol. 4760, p. 1014-1023, High-Power Laser Ablation IV, Claude R. Phipps; 09/2002).

Reder does not teach a laser method for rectangular regions, as in claim 34 .

Chang et al. teaches manufacturing methods of laser ablation, which include patters of rectangular shape, as in claim 34 (see abstract).

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to include a laser method for rectangular regions, as Chang et al., when using the method of imaging a laser beam onto an edge region, as Reder, because Chang et al. teaches a method improvement that allows precise control of various shaped parameters, a laser processing improvement (see abstract).

Claim Rejections - 35 USC § 103

Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Reder, and Rizvi et al., as applied to claims 3-4, 6, 7-9, 24, 26, 28-29, 31, 39, 40, 42, and 43 above, further in view of Chang et al.

Reder does not teach a laser method for rectangular regions, as in claim 35.

Chang et al. teaches manufacturing methods of laser ablation, which include patterns of rectangular shape, as in claims 34 and 35 (see abstract).

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to include a laser method for rectangular regions, as Chang et al., when using the method of imaging a laser beam onto an edge region, as Reder, because Chang et al. teaches a method improvement that allows precise control of various shaped parameters, a laser processing improvement (see abstract).

Claim Rejections - 35 USC § 103

Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Reder, as applied to claims 1, 2, 5, 10, and 38 above, further in view of Bosman et al. (5,759,416).

Reder fails to teach the removal of a layer applied to the substrate by a galvanic coating process, as claim 41.

With respect to claim 41, Bosnic et al. teaches a method of desired selective laser removing a Sn-rich material which is applied by electrolytic process (i.e. a galvanic coating process).

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to include that the removal of the material which is applied by a galvanic coating process, as Bosnic et al. teaches, when using the method of imaging a laser beam onto an edge region, as Reder, because Bosnic et al. teaches the benefit of being able to remove material in a desired selective location (see col.2, para 1).

Response to Arguments

Applicant's arguments filed 9/6/2006 have been fully considered but they are not persuasive. Applicants argue, on page 9, that the reference of Rizvi et al. does not describe removal of an edge region of a layer. Rizvi et al. clearly anticipates ejecting and/or removing material from the edge rejoin. MSN Encarta evidences the terms eject and remove are synonyms, in reference to vacating; which is what the material is doing, i.e. vacating the edge rejoin. As to the removal of said material specifically on an edge region, note arrows pointing to the area on the edge, below, where material has been vacated.

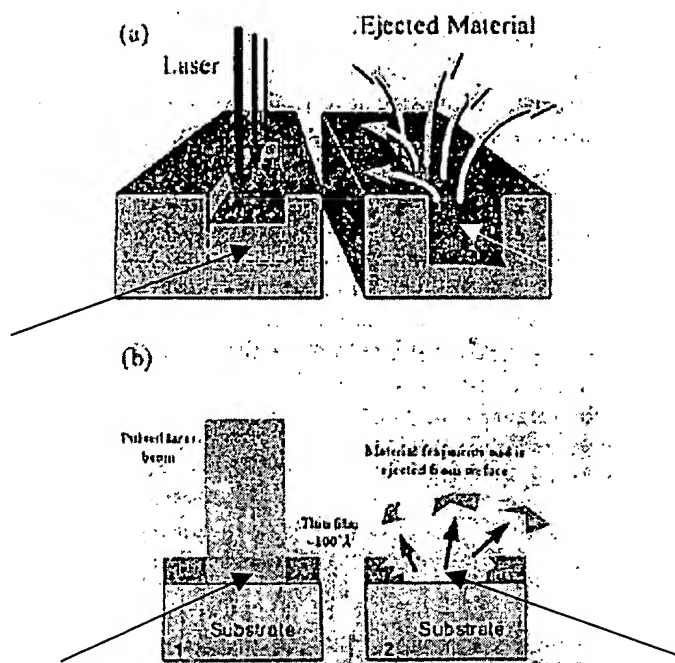


Fig. 1 (a) Direct patterning by laser ablation and (b) Removal of thin films

As far as applicants' argument, on page 9, the method being performed to a layer on a substrate, examiner referenced figure 1b, which clearly shows a substrate with a layer, in which the edge layer has an edge region that is removed. As for applicants' argument, on page 10, towards the new limitation "at the perimeter", examiner agrees that this amendments has overcome the reference of Rizvi et al.

Applicants' argue, on page 10, that Rizvi et al. only teach removal of masked/unmasked patterned areas on a substrate, disposed only at central portions of a substrate. Examiner finds no reference for such a limitation, in the reference of Rizvi, yet finds many figure which clearly illustrate the removing an edge rejoin. Edge is defined by dictionary.com as: a border at which a surface terminates. Examiner

interprets the term edge to mean any of such surface termination points (i.e. top, side, bottom, etc.).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patricia A. George whose telephone number is (571)272-5955. The examiner can normally be reached on weekdays between 7:00am and 4:30pm.

Art Unit: 1765

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571)272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

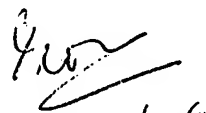
Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



PAG
1006

Patricia A George
Examiner
Art Unit 1765

DUY-VU N. DEO
PRIMARY EXAMINER



10/26/06

